Proof of concept and advancement of the CellFlux concept

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The CellFlux pilot scale test unit

Background

While two tank molten salt concepts represent today's state of the art this technology has only a limited potential for significant improvements. Innovative approaches are required here.

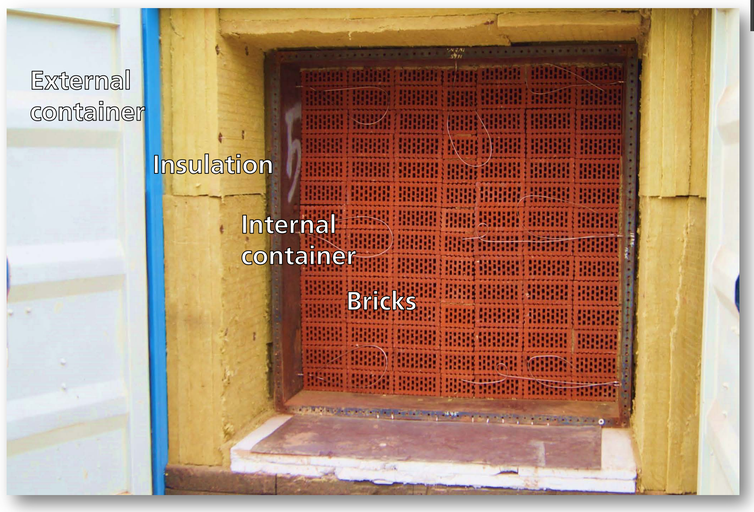
The CellFlux-concept

The CellFlux concept has been developed by DLR. This development aims at

- Cost reduction
- Flexibility in working fluids (thermal oil, molten salt, CO_2, liquid metal)
- Application in a wide temperature range (0 - 800 °C)
- Flexibility in nominal power
- Flexibility in nominal capacity

Characteristic features of the CellFlux-concept:

- Application of low-cost solid storage media
- Air is used as an intermediate heat transfer fluid in a closed cycle
- Direct contact heat transfer between air and storage medium
- Energy is transferred between the external heat transfer fluid and the closed air cycle
- Storage system is composed of modules



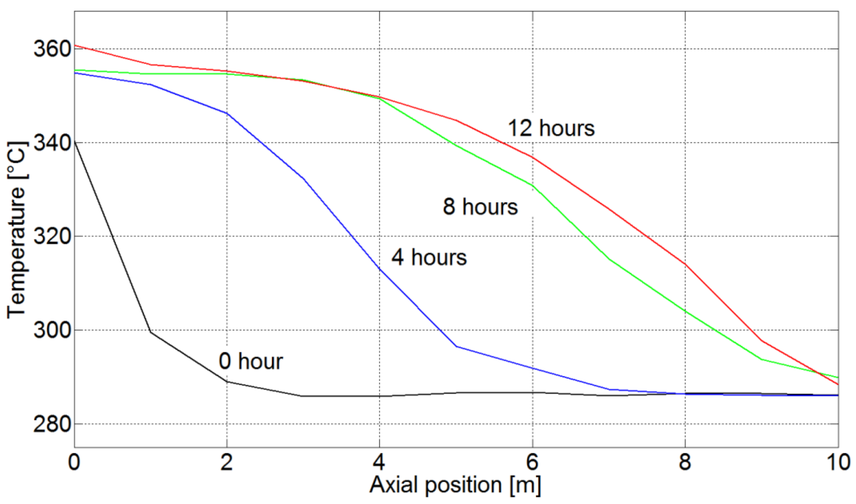
View on opened storage volume

Pilot scale test unit

DLR has built a pilot scale test unit to demonstrate the feasibility of the CellFlux concept. A storage volume of 30 m³ was integrated into an insulated standard 12m container. Perforated bricks are used as storage material. A finned tube heat exchanger transfers the thermal energy between a synthetic thermal oil loop and the air cycle. The air is circulated by a radial fan.

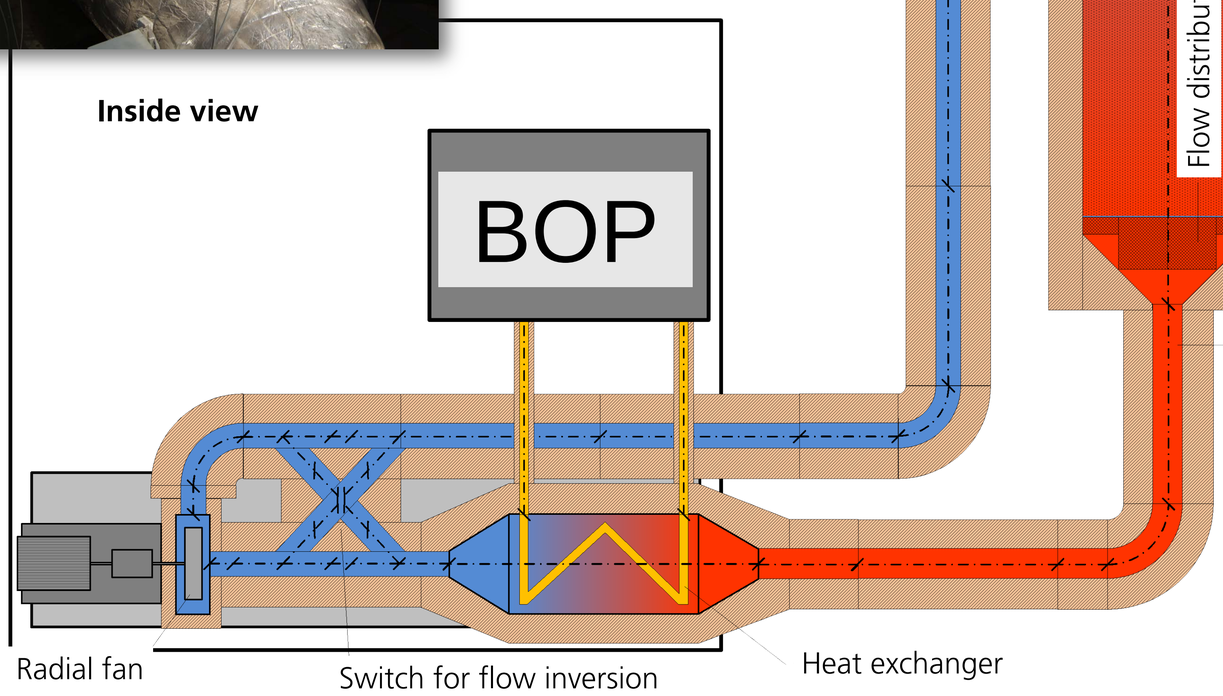
Technical data:

Power (charging):	80 $kW_{thermal}$
Power (discharging):	150 $kW_{thermal}$
Storage mass:	ca. 40 t
Storage capacity:	max. 2500 kWh
Temperature range:	200-400 °C
Mass flow rate air:	max. 5 t/h



Measured spatial temperature distribution in storage volume after step-like increase of inlet temperature

Inside view



Scheme of pilot scale test unit

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